TRANSACTIONS
OF THE
ROYAL SOCIETY OF NEW ZEALAND

BOTANY

VOL. 1 NO. 2. SEPTEMBER 15, 1961.
[Continued from *Transactions of the Royal Society of N.Z.*, Volume 88, Part 4.]

Locating the Vegetation of Early Canterbury: A Map and the Sources

By W. B. JOHNSTON
University of Canterbury
[*Received by the Editor October 31, 1960.*]

Abstract

A distribution map of the main vegetation types of the Canterbury Plains and Downlands, including Banks Peninsula, during early European times, is presented. The depository of one inch to one mile maps on to which have been plotted the detailed vegetation boundaries, is recorded and the basic sources are given.

THIS paper has three aims. The first is to present a map showing the general distribution of the main vegetation types of the Canterbury Plains and Downlands, including Banks Peninsula, during early European times. The second is to indicate the depository of cadastral maps at a uniform scale of one inch to one mile on which the detailed boundaries of the vegetation shown in the generalised map have been plotted. And the third purpose is to provide a record of the basic sources from which the one inch to one mile maps of vegetation have been constructed.

It is apparent from numerous enquiries that a number of workers in various fields are, at one time or another, interested in obtaining accurate distribution maps of vegetation for as early a date as possible. Although maps of the distribution of "pre-European" vegetation for New Zealand as a whole have been constructed, they are at a small scale and, therefore, give only a general idea of the distribution (Cumberland, 1941; McLintock, 1959). Moreover, it is apparent that they are largely based upon present vegetation remnants, soil indicators, historical descriptions and a few, early, general surveys. The first surveys of Canterbury, as for example, the *Sketch Map of the Country Intended for the Settlement of Canterbury* (Thomas, 1849), indicate the approximate location of bush and swamp, but it is impossible to use them as an accurate basis for plotting the detailed distribution of vegetation. However, a search of the files of the Christchurch office of the New Zealand Lands and Survey Department has yielded a wealth of early manuscript maps, produced by the early surveyors who were engaged in laying out sections and who, at the same time, often mapped the vegetation. Because of the increasing old age of these maps and the use made of them by research workers as well as in the normal course of the Department's work, many of them are now rather dilapidated and may fairly soon become of little use as historical documents.

Published by the Royal Society of New Zealand, c/o Victoria University of Wellington, P.O. Box 196, Wellington.

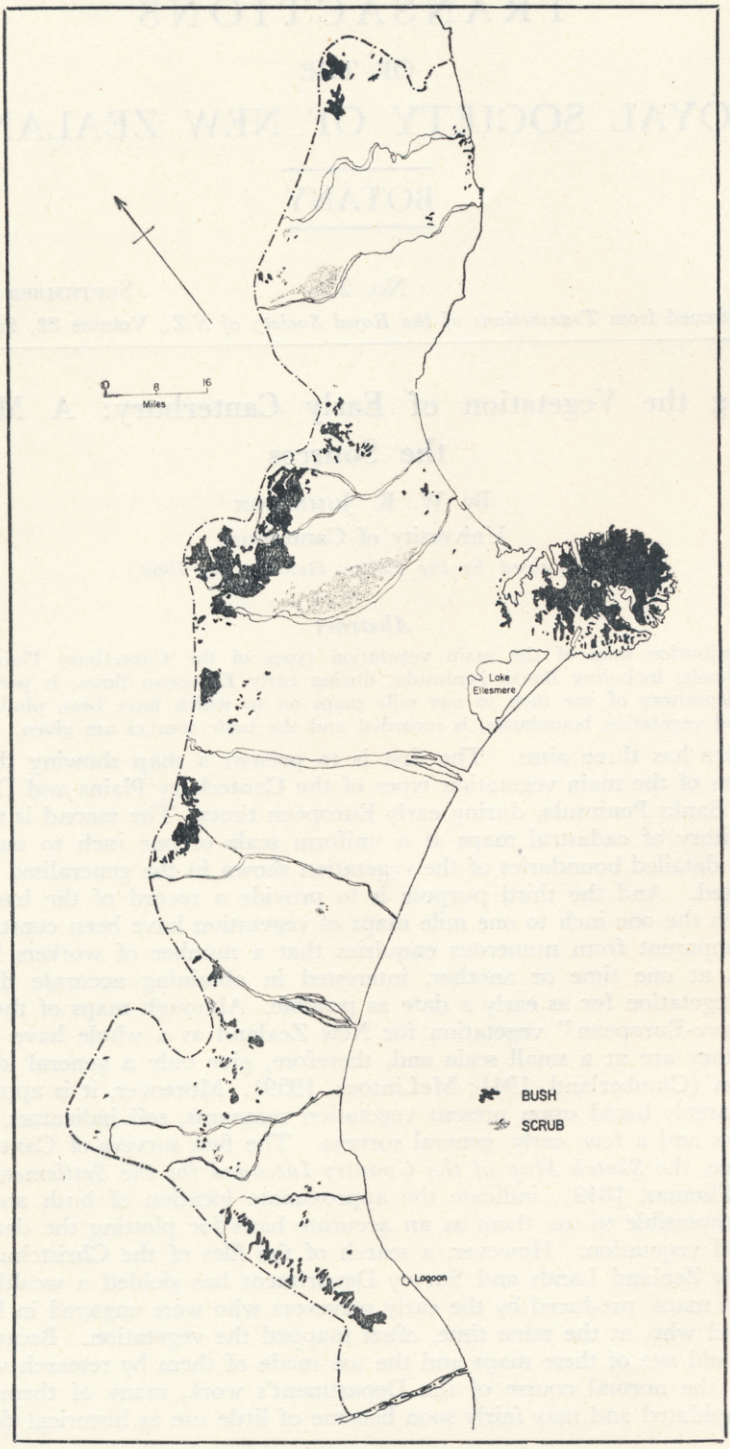

FIG. 1.—Distribution of bush and scrub on the Canterbury Plains and Downlands, including Banks Peninsula, during early European times: based upon contemporary map sources. The dotted and dashed line marks the approximate inland boundary of the area for which maps containing accurate vegetation detail have been found.

This is one reason why it appears advisable to make available an alternative source of the information.

The search for accurate maps is not a simple task as the working files of the Lands and Survey Department are not in a form which allow an investigator to know what is on a map without seeing it. The cyclostyled booklet *Maps of Canterbury and the West Coast:A Selected Bibliography* (Canterbury Branch, N.Z. Geographical Society, 1958) is not exhaustive and is of minor use for this particular purpose. It is necessary, therefore, to handle several hundred maps. For this reason it seemed advisable to provide a record of the basic sources which can be readily found in the Department's files at the Christchurch office.

The amount of vegetation data recorded on the maps varies considerably. The detail is of good standard for the coastal margins and along the foothills, a natural result of the presence of coastal swamps, and of bush on the foothills. Out on the open plains detail is usually inadequate and only major areas of scrub have been located in sufficient detail to permit accurate plotting. In general the recorded vegetation types are bush, swamp and scrub. The dates of the surveys vary from area to area (and are sometimes not known), as does the detail in terms of descriptive notes on the vegetation and boundaries. The scales of the maps range from two miles to one inch to plans at two chains to one inch, but for the most part the scale is 10 chains to one inch.

No attempt has been made to locate vegetation in the high country of Canterbury from early maps. There is considerable evidence to suggest that early maps of the area are generally lacking, either completely in vegetation data or, where vegetation is recorded, in accuracy. Vegetation recorded on early maps of the high country is largely sketched in and is not plotted from detailed surveys.

A General Vegetation Map

Figures 1 and 2 show the general distribution of vegetation in early European times. The outline of the coast, lakes and rivers is drawn from the 1:500,000 N.Z. Topographical Map of 1949 (N.Z. Mapping Service No. 19) and is, therefore, the modern situation. The major discrepancy is in the course of the lower Waimakariri River but, at this scale, the variation is not significant. However, on the one inch to one mile vegetation maps that have been constructed, the course at the time of survey is plotted.

A comparison of Figures 1 and 2 with the earliest known sketch maps of Canterbury shows a general agreement in vegetation distribution. Similarly a comparison with the "Pre-European Vegetation" map in *A Descriptive Atlas of New Zealand* (McLintock, 1959) indicates a large measure of agreement. Apart from the understandable differences that arise from the greater generalisation involved in the "Pre-European Vegetation" map, it does appear that the extent of forest, in at least the eastern part of Banks Peninsula, was greater than is there suggested. In Figure 2, an area of swamp might reasonably be expected adjacent to the left bank of the lower Ashburton River, but no accurate record of this has been uncovered. The Balmoral and Eyrewell areas of scrub are prominent, but only minor areas of scrub have been found in the records for the open plains of Mid-Canterbury. Written across the early maps of this area there are notes of "scattered small clumps of manuka scrub" on the light, stony soils.

The One Inch to One Mile Vegetation Maps

The general map of vegetation is a summary of the one inch to one mile maps that have been compiled. The depository for these maps is the Map Library of the Department of Geography, University of Canterbury, Christchurch. Figures 1 and 2 form, in a sense, an index map for the one inch to one mile sheets on which greater detail and accurate boundaries are available.

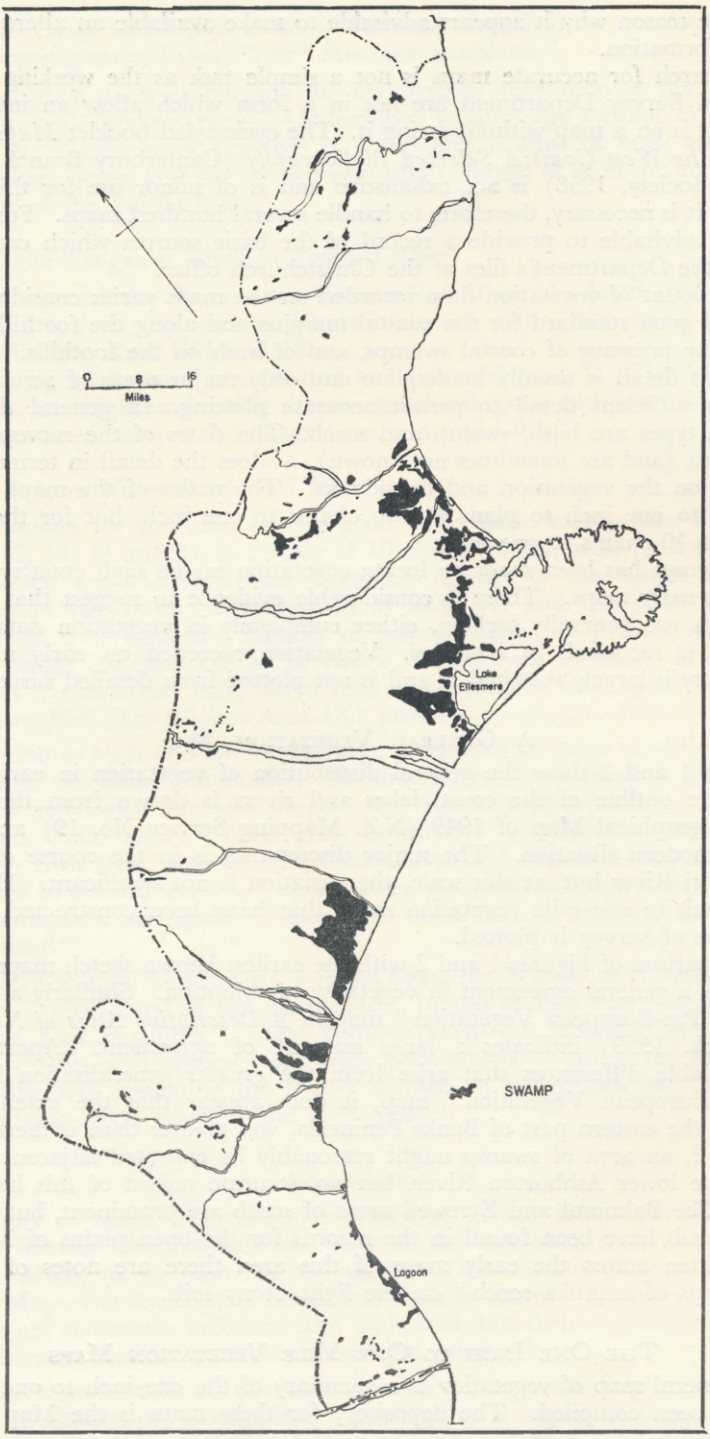

FIG. 2.—Distribution of swamp on the Canterbury Plains and Downlands, including Banks Peninsula, during early European times: based upon contemporary map sources. The dotted and dashed line marks the approximate inland boundary of the area for which maps containing accurate vegetation detail have been found.

The one inch to one mile scale was chosen for a base because the published New Zealand Cadastral Map—Survey District Series (N.Z.M.S. No. 13) and County Series (N.Z.M.S. No. 15) show the boundaries of surveyed sections in addition to topographical features, and provide a complete and uniform coverage. On nearly all the early manuscript maps used in this project the vegetation is recorded on a background of the sections surveyed at their respective dates. It is therefore possible to use the limiting lines of the sections as a means of accurately locating the vegetation boundaries, during the process of transfer. In turn, it is possible to accurately transfer the boundaries now recorded on the one inch to one mile maps held in the depository.

THE NATURE OF THE MAP SOURCES

The amount of data available on the manuscript maps in the Lands and Survey Department at Christchurch varies a great deal and, to support the one inch to one mile vegetation maps, as well as to facilitate use of the original sources, it is necessary to comment at some length. The sources are not uniform in scale, date, or detail. For some areas vegetation is either not recorded on the first detailed surveys or the original maps are not known to be still in existence; thus, the second surveys had, perforce, to be used. In the case of some of the maps the significance of particular lines was not clearly indicated, and it was necessary to check them against maps in the same series for adjacent areas, and against maps of the same area, drawn at a later date but incorporating additional information from the surveyors' notebooks as well as the original data. Wherever possible a series of checks and cross-checks was made to elucidate and support the earliest known maps.

In order to comment on the sources, Canterbury has been divided into convenient areas (Fig. 3). For each area, the basic maps are noted and discussed. Anyone interested in a particular section of country may, therefore, readily find reference to the appropriate maps and obtain some idea of the information contained on them. Not all the maps have the date of survey recorded on them. Unless specifically indicated, the dates recorded here are those on the manuscript maps. In any one series of maps, a date is often given on only one map but, in this case, it is not unjustified to assume that the series was mapped at approximately the specified date. Wherever possible, the scale of the map is given; in most other cases the scale is larger than one inch to one mile, although unrecorded on the map.

Area I: Conway River to Hurunui River

The basic source for the area is the *Amuri Square Maps* drawn at a scale of twenty chains to one inch. No date is recorded on any of the maps, but it is known that the surveys were done immediately after the Nelson Waste Lands Act of 1863 which set up the system of "squares". The date appears to be no later than 1865 as grants of land, based upon the surveys, were made in 1866. The maps plot the boundaries of the vegetation and record some descriptive notes.

The most northerly area of bush (Fig. 1) which lies between Mt. Tinline and the inland road to Kaikoura, is "mostly birch". Immediately to the south, the equally-large Lottery bush is "black birch and a few rimu". The small clumps of bush on the foothills along the western margin of the Culverden basin are "birch bush" and the clumps in the neighbourhood of the mouth of the Waiau River, are "white pine, black birch, and totara".

The large swamp between the Leader and Conway rivers is "flax swamp" and the areas along the eastern margins of the Culverden basin are described as "raupo swamp". The extensive scrub belt on the present area of the Balmoral plantation is described as "manuka scrub", as are the small patches on the lower hill slopes immediately to the north.

Area II: Hurunui River to Ashley River

A series of maps, by the surveyors Wilson and Pemberton, cover the lower part of the area at a scale of 10 chains to one inch—namely, *Black Maps* 8 (dated 1861 and signed by Cass as Chief Surveyor), 2, 3, 4, 5, 6, 7, 9, 10 and 11. The lower margin of the bush between Mt. Thomas and Ashley Gorge is plotted from this series while the inland margin is taken from the N.Z. Cadastral Map—Survey District Series of 1886-1899 which were based on *Topographical Maps* at 40 chains to one inch and drawn in 1877-1882. The bush in the area of Mt. Grey and the present Ashley State Forest is taken from the *Small Plots* of 1880-1885 on which the sections in the area were surveyed. Some details of the swamp at Sefton are plotted from *Map 23,* at a scale of two inches to one mile, located in Bay 93 of the Basement Library of the Lands and Survey Department.

Red Map 126, constructed in 1864 (approximately) at a scale of four miles to one inch, provides a general check on the area. None of the maps give any descriptive notes on the composition of the vegetation types.

Area III: Ashley to Waimakariri Rivers—Inland

The basic sources for the swamps and Harewood forest are *Black Maps* 15, 16, 18, and 109, all drawn at a scale of ten chains to one inch, and *Red Map* 60, all of which were surveyed by Boys. *Red Maps* 126 (see Area II) and 61 were used in checking. No date is recorded for any of the maps, but the surveys incorporated in the *Black Maps* were made in the early 1850's. The inland margin of the bush is taken from the N.Z. Cadastral Map—Survey District Series drawn in 1886 from *Topographical Maps* of 1877-1882. Between the large Oxford swamp and Harewood forest, and running north to Ashley Gorge, is a zone variously described as "fern and flax", "grass and fern", and "flax and grass".

The Eyrewell scrub belt is from the *Large Plots* of 1879 for the Burnt Hill area. For the western section, near the present Waimakariri gorge bridge, the *Large Plots* of 1887 record "burnt-over scrub" and many small remnants of "manuka". The eastern margin of the scrub belt is from *Black Map* 17 at 10 chains to one inch and signed by Boys; and the continuation westwards towards Burnt Hill is from the *Large Plots* of 1874. The whole belt is described as "manuka".

Area IV: Ashley to Rakaia Rivers—Coastal Plain

There is an abundance of early maps at large scales for this area and they provide a wealth of fine detail on the distribution and character of the tussock grassland community in addition to that of the extensive swamps and sparse bush. For the area between Christchurch and the Ashley River, *Black Maps* 312–337 (inclusive), 340–357 (inclusive), 492, 495 and 496 are at a scale of 10 chains to one inch, signed by Cass as Chief Surveyor and dated 1856. From Lincoln to the Ashley River, *Black Map* 187 gives accurate detail of the swamps and bush at one inch to one mile and is dated 1854. The data on bush and swamp are accurately reduced to a scale of two inches to one mile on *Black Map* 95, signed by Cass as Chief Surveyor at an approximate date of 1855. Other maps used for the area are *Black Map* 17 (see Area III) and *Red Maps* 123 (10 chains to one inch) and 126 (see Area II).

There are no descriptive notes on the bush, but the small and historically-important areas at Rangiora, Tauhiwi, Woodend, Kaiapoi, Ohoka, Papanui and Riccarton are mapped. The extensive swamps are generally described as "raupo" or "raupo and flax". From Lincoln to the Ashley River, the vegetation of the land between the swamps is mapped in very fine detail and is variously described in terms of "flax and grass", "flax, anise and grass", "flax, grass and tutu", "flax and toi toi", or "toi toi and tupaki". The sandhills are delimited and noted as covered in a "rough growth of scrub, flax, fern, grass and toi toi".

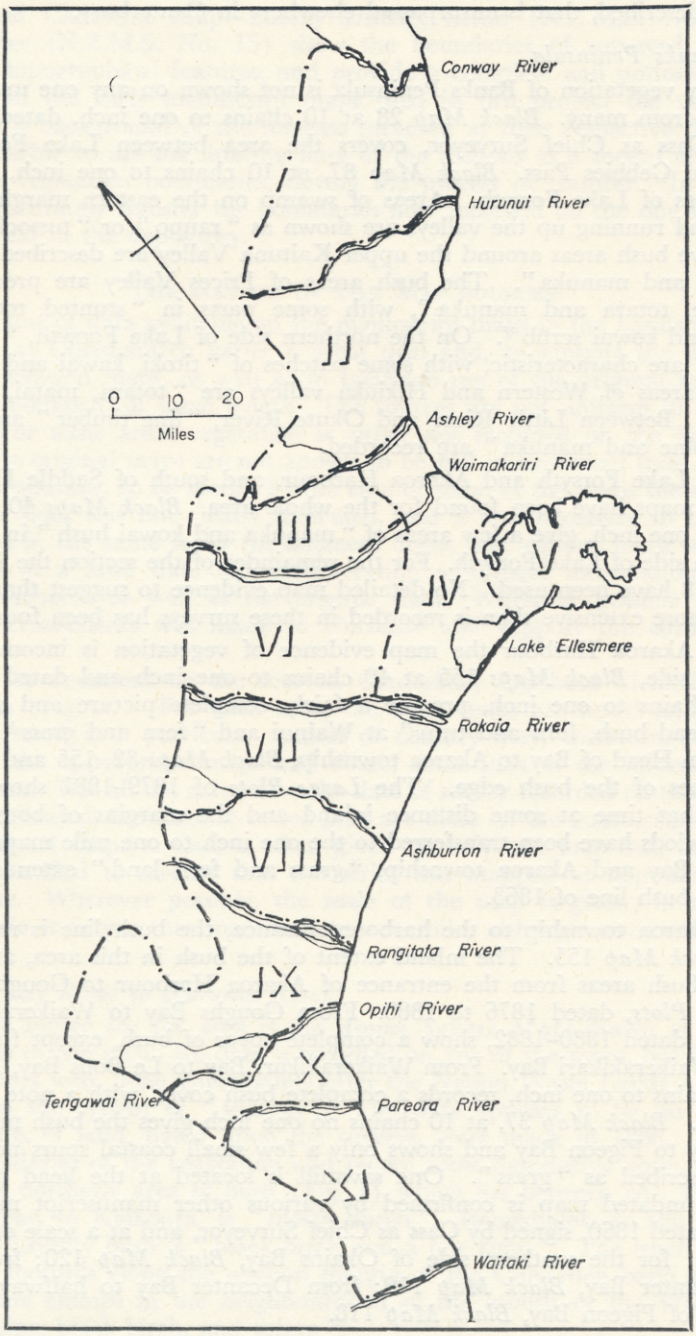

FIG. 3.—Map showing the division of the Canterbury Plains and Downlands, including Banks Peninsula, into convenient areas for the discussion of basic map sources.

For this area there is a very early map record of vegetation distribution, finely drawn and described, that is unsurpassed elsewhere in Canterbury.

Area V: Banks Peninsula

The early vegetation of Banks Peninsula is not shown on any one map but is a compilation from many. *Black Map* 28 at 10 chains to one inch, dated 1862 and signed by Cass as Chief Surveyor, covers the area between Lake Forsyth, Mt. Herbert, and Gebbies Pass. *Black Map* 87, at 10 chains to one inch, covers the upper reaches of Lake Forsyth. Areas of swamp on the eastern margins of Lake Ellesmere and running up the valleys are shown as "raupo" or "tussock swamp". The extensive bush areas around the upper Kaituna Valley are described as "black pine, totara and manuka". The bush areas of Prices Valley are predominantly "black pine, totara and manuka", with some parts in "stunted totara" and "waipuka and kowai scrub". On the northern side of Lake Forsyth, "black pine and totara" are characteristic, with some patches of "titoki, kawai and manuka". The upper areas of Western and Hikiuka valleys are "totara, matai, Kahikatea and rimu". Between Little River and Okute River, "fine timber" and "kowai, sugar loaf pine and manuka" are recorded.

Between Lake Forsyth and Akaroa Harbour, and south of Saddle Hill, no detailed early maps have been found for the whole area. *Black Maps* 40 and 41, at 10 chains to one inch, give a few areas of "manuka and kowai bush" in the valleys on the south side of Lake Forsyth. For the remainder of the section the *Large Plots* of 1877–1878 have been used. No detailed map evidence to suggest that the cover was much more extensive than is recorded in these surveys has been found.

Around Akaroa Harbour the map evidence of vegetation is incomplete. For the western side, *Black Maps* 155 at 40 chains to one inch and dated 1863, and 32, at 10 chains to one inch, provide a fairly complete picture and also record areas of "dead bush, fern and tutu" at Wainui and "fern and grass" at French Farm. From Head of Bay to Akaroa township, *Black Maps* 32, 155 and 227 locate some stretches of the bush edge. The *Large Plots* of 1879–1881 show the bush margin of that time at some distance inland and the margins of both the early and later periods have been transferred to the one inch to one mile maps. Between Takamatua Bay and Akaroa township, "grass and fern land" extends from the coast to the bush line of 1863.

From Akaroa township to the harbour entrance, the bush line is recorded for 1863 on *Black Map* 155. The inland extent of the bush in this area, and the discontinuous bush areas from the entrance of Akaroa Harbour to Goughs Bay, are from *Large Plots,* dated 1876 to 1880. From Goughs Bay to Waikerakikari Bay, *Large Plots,* dated 1880–1882, show a complete cover of bush, except for a coastal swamp in Waikerakikari Bay. From Waikerakikari Bay to Le Bons Bay, *Black Map* 38, at 10 chains to one inch, records a complete bush cover, with a note of "totara and matai". *Black Map* 37, at 10 chains no one inch gives the bush margin from Le Bons Bay to Pigeon Bay and shows only a few small coastal spurs not in bush; they are described as "grass". One sawmill is located at the head of Le Bons Bay. This undated map is confirmed by various other manuscript maps, all of which are dated 1860, signed by Cass as Chief Surveyor, and at a scale of 10 chains to one inch: for the southern side of Okains Bay, *Black Map* 120; from Okains Bay to Decanter Bay, *Black Map* 119; from Decanter Bay to halfway along the eastern side of Pigeon Bay, *Black Map* 118.

From Pigeon Bay to Port Levy, *Black Maps* 39, at 10 chains to one inch, and 150, at 40 chains to one inch, give some bush areas, and the coverage is extended by *Black Map* 117, at 10 chains to one inch, for the head of Pigeon Bay, and by *Black Map* 228, dated 1860 and signed by Cass, for the Blind Bay-Big Bay area. From Port Levy to Governors Bay, *Black Map* 27, at 10 chains to one inch, gives

some bush margins. Particularly around Port Levy and west towards Lyttelton Harbour, *Large Plots* of 1878-1881 were used to link up the earlier bush margins and, in places, to extend the bush. For the Port Hills, from Gebbies Pass northwards, *Black Map* 25, at 10 chains to one inch, plots several areas of bush.

In toto, this series of maps results in a picture of the extent of bush on Banks Peninsula in the early 1860's, and indicates an extensive forest in the eastern half and a few scattered areas in the western half.

Area VI: Waimakariri River to Rakaia River—Inland

The basic source for the Kowai bush area is *Black Map* 67 at a scale of 10 chains to one inch. Other sources for the area as a whole are *Red Maps* 121, at one inch to one mile, signed by Baker and showing the vegetation at 1885, and 126 (see Area II). The inland margins of the bush are from the N.Z. Cadastral Map—Survey District Series drawn in 1886 and based on *Topographical Maps* of 1877-1882.

Area VII: Rakaia River to Ashburton River

The inland bush and swamp are from *Black Maps* 179 (dated 1858 and signed by Cass as Chief Surveyor), 180 (1856, Cass), and 170 all at scales of one inch to one mile. Other sources of use in the area are *Red Maps* 121 (see Area VI) and 126 (see Area II), and the N.Z. Cadastral Map-Survey District Series, drawn in 1889 and based on *Topographical Maps* of 1877-1882. Although the series include the coastal areas, no firm indication of swamp along the lower Ashburton River has been found, nor has any of the maps plotted scrub on the open plains.

Area VIII: Ashburton River to Rangitata River

The extensive coastal swamp is from *Map* 30 located in Bay 93 of the Basement Library of the Lands and Survey Department. This map, at a scale of one inch to one mile, is dated 1858 and signed by Cass. *Black Map* 180 (see Area VII) is useful, as are *Red Maps* 121 (see Area VI) and 126 (see Area II). Small clumps of scrub on the open plains between the Ashburton and Hinds rivers are from *Large Plots* of 1878.

Area IX: Rangitata River to Opihi-Tengawai River

A wealth of early maps at various scales are available for the area. *Timaru Roll Map* 61, dated 1859-1860 and at a scale of one inch to two miles, shows the general location of bush and scrub on a base which has only a few surveyed sections. A series of maps at 10 chains to one inch give an excellent record of the vegetation for the area—namely, *Timaru Roll Maps* 1 (dated 1866 and signed by Cass), 2, 3 (1866, Cass), 4, 5, 7, 8 and 9. Peel forest is shown on *Timaru Roll Map* 19, *Black Map* 125 (both at a scale of 10 chains to one inch) and on *Black Map* 169, dated 1870 and signed by Davie, at a scale of one inch to one mile. Bush and swamp in the Waihi-Geraldine area are given on *Timaru Roll Map* 20 and on *Black Maps* 89, 90 and 91, all of which are drawn at a scale of 10 chains to one inch. The same area is mapped at two inches to one mile in *Black Maps* 171 and 172. Arowhenua bush and nearby swamps are also mapped in *Black Map* 173, dated 1873, at a scale of two inches to one mile, and the bush is sketched in *Red Map* 140, dated 1848, at a scale of 20 chains to one inch. Kakahu bush is shown on *Timaru Roll Maps* 30 and 31 at a scale of 10 chains to one inch.

Notes on the vegetation of the country between the Rangitata and Opihi rivers are given on various maps but no description of the bush has been found; the swamps are described as "raupo" or "tussock grass, flax and toi toi". The character of the downs and plain is described by a series of notes but no detailed mapping of boundaries is shown. Thus, the plain between the Rangitata and Orari rivers is "stony grassland", and the country between Temuka and the hills is "grassland with flax and fern". The dry land in amongst the coastal swamps

between the Orari and Opihi rivers is variously described as " tussock grass and toi toi ", " open grassland stony ", or " fine open grassland ".

No descriptive notes accompany the mapping of vegetation in the area of the Fairlie basin and Brothers range. Undescribed swamps are located in the Totara valley and in Fairlie basin. Patches of scrub and clumps of bush are indicated on the Brothers range, and one or two very small clumps of bush are found around the margins of the Fairlie basin.

Area X: Opihi-Tengawai River to Pareora River

The basic sources for the area are *Timaru Roll Maps* 11 (dated 1866 and signed by Cass) and 6, both at a scale of 10 chains to one inch. Also useful are *Timaru Roll Maps* 61 (see Area IX) and 16.

The swamp at Pareora is described as " flax and grass ". The Mt. Horrible area is given as " high, undulating downs—good soil, grass and flax " and the lower downs coastwise of here, as " cabbage trees, grass and flax ".

Area XI: Pareora River to Waitaki River

The coverage for the area is very good. The basic sources are *Timaru Roll Maps* 10, 12, 13, 14 and 15 at a scale of 10 chains to one inch, unmounted duplicates of which are located in the Basement Library of the Lands and Survey Department in two folios, one classified as *Map* 31, and the other unclassified. Waimate bush is covered in a number of maps; namely, by *Timaru Roll Map* 33 and *Black Maps* 232 and 233 at 10 chains to one inch, by *Black Map* 307 at a scale of four chains to one inch, dated 1865 and signed by Cass, and by *Black Map* 302. *Timaru Roll Map* 61 (see Area IX) provides a valuable check.

In addition to bush and swamp the area is mapped in terms of various elements in the tussock grassland community. No description of the bush is given but the swamps are noted as " flax and raupo " or " wet tussock swamp ". Between the Pareora and Otaio rivers, " open grass downland " is intersected by " fern and tutu " along river flats. Between the Otaio River and Waimate, the inland downs are described in general terms as " open downs, grass and cabbage trees " with valley flats of " tutu, fern and grass ". Along the coast and in amongst the swamps is " dry grassland ".

South of Waimate, " Irishman " is noted along the Waihao river, and " fine open grass downs " rise inland of the main road. Inland of Old Ferry road are " high grass downs, fern in gullies ". The Waihao downs are described as either " fine undulating downs, well grassed " or " high grass downs ". Along the length of the Hunters Hills and separating the fingers of bush in the gullies are " rough spurs from mountains—fern, manuka and snow grass ".

CONCLUSION

A number of maps of Canterbury published in the 1860's (Browning, 1863; Ward and Reeves, 1867) incorporate some of the vegetation from the earlier *Red* and *Black Maps,* as do many of the sheets in the various editions of the N.Z. Cadastral Map—Survey District Series and County Series. However, the lines on these maps are commonly indefinite and undefined, but their significance is illuminated by checking against the record here presented.

It is not claimed that an exhaustive search for accurate map sources of early vegetation in Canterbury is complete. However, it is hoped that this paper, used in conjunction with the one inch to one mile vegetation maps in the depository, will facilitate the work of those already seeking such information and, at the same time, encourage further search for early map sources that may still be in existence.

ACKNOWLEDGMENTS

I gratefully acknowledge the willing co-operation of the Christchurch office of the N.Z. Lands and Survey Department and, in particular, the knowledge and advice of Messrs. C. Holdsworth and J. A. Hayward. I am indebted to the N.Z. Carnegie Social Science Research Committee for financial assistance.

LITERATURE CITED

CANTERBURY BRANCH, N.Z. GEOGRAPHICAL SOCIETY, 1958. *Maps of Canterbury and the West Coast: A Selected Bibliography.* Christchurch.

CUMBERLAND, K. B., 1941. A Century's Change: Natural to Cultural Vegetation in New Zealand. *Geographical Review,* 31: 529–544.

MCLINTOCK, A. H. (Ed.), 1959. *A Descriptive Atlas of New Zealand.* Wellington.

MAPS CITED

BROWNING, S., 1863. *Canterbury Province—Pasture Runs.* Published map; scale 1 inch to 5 miles; copy in Lands and Survey Department, Christchurch.

THOMAS, J., 1849. *Sketch Map of the Country Intended for the Settlement of Canterbury.* Manuscript map; scale 1 inch to 2⅔ miles approximately; original in Canterbury Museum, Christchurch; reference 048.

WARD, P., and REEVES, 1867. *Canterbury Province—Pasture Runs.* Published map; scale 1 inch to 4 miles; copy in Lands & Survey Department, Christchurch.

W. B. JOHNSTON,
Department of Geography,
University of Canterbury,